

Notice of Allowability

Application No.

08/309,868

Examiner

CHESTER T. BARRY

Applicant(s)

YASUI ET AL.

Art Unit

1797

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERIT IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to prelim amdmnt of 3/3/08.
2. ☒ The allowed claim(s) is/are 2-5,11,12,15 and 16.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr Terry Chapman on 2/21/08.

The application has been amended as follows:

IN THE SPECIFICATION

In the title, -- AND APPARATUS -- was deleted.

The following is an examiner's statement of reasons for allowance:

LEVIN

USP 4200524 to Levin describes a process for aerobic biological treatment¹ of an aqueous organic waste comprising the steps of:

introducing the aqueous organic waste 1² into an aeration tank 3;³

aerating the aqueous organic waste in the aeration tank in the presence of a biosludge⁴ comprising aerobic microorganisms⁵ to form an aerated aqueous suspension in which biosludge is grown from the aqueous organic waste and biosludge is lost by autolysis;⁶

¹ "[B]iological treatment" (Col 2 line 24).

² "Raw or primary sewage" (figure).

³ "Aeration basin" (figure).

⁴ "The . . . sewage is mixed with recycled, activated sludge . . ." (col 2, lines 13 – 15).

⁵ "During aeration, the bacteria . . . consume organic matter . . ." (col 2 lines 24-26).

⁶ Simultaneous growth and autolysis of biosludge appears to be inherent in aerobic activated sludge systems (no citation).

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withdrawing aerated aqueous suspension from the aeration tank (4) and introducing the withdrawn aerated aqueous suspension into a solid/liquid separation unit, e.g., "settling basin" 5;

subjecting the aerated aqueous suspension in the solid/liquid separation unit 5 to solid/liquid separation to form a separated sludge 7 and a separated liquid phase, e.g., "effluent" 6;

discharging the separated liquid phase 6 from the process as treated water, e.g., "effluent" 6;

recycling at least a portion of the separated sludge back to the aeration tank, e.g., "return sludge" 8;⁷

ozonizing . . . another portion 13 ("accompanying return sludge, R_b") of the separated sludge in an ozonization vessel⁸ to ozonize and convert biosludge contained in the . . . another portion of the separated sludge into BOD components;⁹ and

recycling . . . the ozonized portion of the separated sludge back to the aeration tank for aerobic biological treatment.

Levin does not disclose the pH of the biosludge at any point at which ozone is added.

It would have been obvious to have adjusted the pH of the biosludge stream to be ozonated to the acidic range, i.e., pH <7, and to have operated the process at the optimal acidic pH because it was known that ozone half-life is longer in lower pH solutions than in otherwise identical higher pH solutions, as is well-known. The pH range of about 3 to about 4.5 is suggested by USP 4,936,983 to Long (at col 4 line 49).

Levin does not state that the amount of biosludge ozonized and converted into BOD components is greater than the difference between the amount of biosludge grown in the aeration tank and the amount of biosludge lost by autolysis.

Moreover, it cannot be said that such limitation is inherently described by Levin. Accordingly, claim 11 is allowable over the prior art.

⁷ The return sludge 8 is not returned directly to the aeration basin 3. Return sludge 8 is returned indirectly to aeration basin 3 via combination first with recovered particulates in conduit 2 and then with the raw or primary sewage influent conduit 1 before return to the aeration basin 3. Insofar as claim 11 does not require that the portion of separated sludge be recycled "directly" back to the aeration tank, the examiner needn't address the issue of whether such modification of Levin would have been obvious.

⁸ Applicants' claim-recited "ozonization vessel" reads on Levin's conduit 13 into which ozone is added (figure) and through which "accompanying return sludge" is recycled back to the aeration basin.

⁹ Levin teaches that addition of a gas facilitates removal of sludge off the biosupport particles. Col 2 lines 54. Insofar as the ozone gas added to the sluffing device, bio-surface separator, and conduit 13 is disclosed as an "oxidizing medium," conversion of at least some of the biosludge to BOD components is inherently described by the disclosure of addition of ozone gas to the biosludge in conduit 13.

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With respect to claim 12, it would have been obvious to have substituted a separation membrane for Levin's settling clarifier because at the time the invention was made, a separation membrane was a known functional equivalent of Levin's settling chamber.

Further, it would have been obvious to have adjusted the pH of the biosludge stream to be ozonated to the acidic range, i.e., pH <7, and to have operated the process at the optimal acidic pH, e.g., at about 3 – about 4.5, for the reasons given above with respect to claim 11, but Levin does not state explicitly or implicitly that the amount of biosludge ozonized and converted into BOD components is greater than the difference between the amount of biosludge grown in the aeration tank and the amount of biosludge lost by autolysis.

Accordingly, claim 12 is allowable over Levin.

SUZUKI

USP 4370235 to Suzuki describes a process for aerobic biological treatment of an aqueous organic waste comprising the steps of:

introducing the aqueous organic waste 1 into an aeration tank 2;

aerating the aqueous organic waste in the aeration tank in the presence of a biosludge comprising aerobic microorganisms to form an aerated aqueous suspension 3 in which biosludge is grown from the aqueous organic waste and biosludge is lost by autolysis;¹⁰

withdrawing aerated aqueous suspension 3 from the aeration tank 2 and introducing the withdrawn aerated aqueous suspension 3 into a solid/liquid separation unit 4;

subjecting the aerated aqueous suspension in the solid/liquid separation unit 4 to solid/liquid separation to form a separated sludge 6" and a separated liquid phase 5;

discharging the separated liquid phase 5 from the process as treated water;

recycling at least a portion 6' of the separated sludge 6" back to the aeration tank;

¹⁰ Simultaneous growth and autolysis of biosludge appears to be inherent in aerobic activated sludge systems (no citation).

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ozonizing . . . another portion 6 of the separated sludge in an ozonization vessel 22 to ozonize and convert biosludge contained in the . . . another portion 6 of the separated sludge into BOD components; and

recycling . . . the ozonized portion of the separated sludge 13 back to the aeration tank 2 for aerobic biological treatment.

Suzuki does not expressly state that the amount of biosludge ozonized and converted into BOD components is greater than the difference between the amount of biosludge grown in the aeration tank and the amount of biosludge lost by autolysis. It cannot be said that this limitation is met by Suzuki merely because no excess sludge is generated in Suzuki.

Suzuki does not disclose the pH of the biosludge in the ozonizer 22.

LONG

USP 4487699 to Long describes ozonation of sewage sludge in a hyperbaric vessel. It teaches adjusting the pH of the sludge to the acidic range, preferably pH 3 – 4.5, before ozonation.

The present invention is an important advancement in the treatment of sewage sludge, generally consisting of four basic steps. Preferably, the first step is to adjust the pH of the sludge to an appropriate acidic level, so that it is more susceptible to aerobic treatment. Second, the sludge is dispersed in an oxygen-rich and, preferably, a pressurized atmosphere. Third, the oxygen reacts directly or indirectly with contaminants in the sludge to convert them into stable materials. Fourth, bacteria contained in the sludge are rendered harmless so that the treated sludge may be disposed of in landfill or other areas without significant adverse environmental consequences.

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An acid, such as sulfuric acid, is obtained from storage tanks, not illustrated, and pumped into the pH adjustment tanks through acid inlet conduits 28 and 28' and remote controlled acid inlet valves 29 and 29'. The acid is mixed with the sludge until a pH level of from about 3 to about 4.5 is reached. It is believed that the optimum value of pH adjustment for most sludge to be treated in accordance with the process is from 3 to 3.5, although the optimum pH for a particular sludge composition may vary, based upon experience. The pH of

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

/Chester T. Barry/

Primary Examiner, Art Unit 1797

571-272-1152